Symbol	Definition	Units
A	Area of cross section of flow	m^2
AHW	Allowable HW	m
B	Barrel width	mm or m
BW	Backwater	m
D	Culvert diameter or barrel height	mm or m
d	Depth of flow	m
d_C	Critical depth of flow	m
g	Acceleration due to gravity	m/s^2
H	Sum of $H_E + H_f + H_O$	m
H_b	Bend headloss	m
H_E	Entrance headloss	m
H_f	Friction headloss	m
H_L	Total energy losses	m
H_O	Outlet or exit headloss	m
H_V	Velocity head	m
h_O	Hydraulic grade line height above outlet invert	m
HW	Headwater depth (subscript indicates section)	m
K_E	Entrance loss coefficient	-
L	Length of culvert	m
n	Manning's roughness coefficient	-
P	Wetted perimeter	m
Q	Rate of discharge	m^3/s
R	Hydraulic radius (A/P)	m
S	Slope of culvert	m/m
TW	Tailwater depth above invert of culvert	m
V	Mean velocity of flow with barrel full	m/s
V_d	Mean velocity in downstream channel	m/s
V_O	Mean velocity of flow at culvert outlet	m/s
V_U	Mean velocity in upstream channel	m/s
γ	Unit weight of water	N/m^3
τ	Tractive force	Pa

CULVERT SYMBOLS
Figure 31-1B